STATUS OF THE CLAIMS

Claims 1-20 are pending. Claims 1, 8, 11, 14, 16, and 19 have been amended.

REMARKS

Pursuant to 37 CFR § 1.121, the above amendments are marked on separate sheets entitled "VERSION WITH MARKINGS TO SHOW CHANGES MADE" following these remarks.

The specification in column 1, line 67 has been amended by replacing the erroneous recitation of "valve 12a" with -- valve 12b -- . Support for this amendment can be found in FIG. 1C which shows fluid (depicted by the bolded arrow) entering the valve assembly 10 through valve 16a and exiting the valve assembly 10 through valve 12b. Hence, no new matter is believed entered by this amendment.

The specification in column 3, line 25 has been amended by replacing the erroneous recitation of "A-A" with -- 3B-3B --. Support for this amendment can be found in FIG. 3A which shows only the section line 3B-3B. Hence, no new matter is believed entered by this amendment.

The specification in column 3, line 63 has been amended by replacing the erroneous recitation of "22° (specifically 22.2°)" with -- 30° --. Support for this amendment can be found in the originally filed disclosure of U.S. application No. 08/715,286, this application being the parent application of U.S. continuation application No. 09/311,520. U.S. continuation

application No. 09/311,520 issued as the above-captioned U.S. Patent 6,112,767. Hence, no new matter is believed entered by this amendment.

The specification in column 4, lines 19-21 has been amended by replacing the erroneous recitation "Fluid entering any of the ports encounters a chamber and channels leading to three diverter valves" with -- Fluid entering any of the ports encounters a chamber and channels leading to at least two diverter valves. Fluid entering port 52, for example, encounters chamber 62 and channels leading to diverter valves 70 and 72. -- Support for this amendment can be found in FIG. 3A. Hence, no new matter is believed entered by this amendment.

The specification in column 4, line 33 has been amended by replacing the erroneous recitation of "A-A" with -- 3B-3B --. Support for this amendment can be found in FIG. 3A which shows only the section line 3B-3B. Hence, no new matter is believed entered by this amendment.

The specification in column 4, line 55 has been amended by replacing the erroneous recitation of "22° (specifically 22.2°)" with -- 30° --. Support for this amendment can be found in the originally filed disclosure of U.S. application No. 08/715,286, this application being the parent application of U.S. continuation application No. 09/311,520. U.S. continuation application No. 09/311,520 issued as the above-captioned U.S. Patent 6,112,767. Hence, no new matter is believed entered by this amendment.

Claims 1 and 11 have each been amended to correct the recitation of "wherein liquid entering any one of said ports encounters one of said chambers and sections of three of said channels which lead to three of said diverter valves," and now recites -- wherein liquid entering

up to two of said ports encounters one of said chambers and sections of three of said channels which lead to three of said diverter valves -- . Support for this amendment can be found in FIG. 3A which shows port 50 communicating with chamber 60, which in turn communicates with diverter valves 70, 76, and 78 via two channels (depicted with broken lines), and port 54 communicating with chamber 64, which in turn communicates with diverter valves 72, 74, and 78 via two channels (also depicted with broken lines). Hence, no new matter is believed entered by these amendments.

Claim 8 has been amended to correct the recitation of "wherein said angles are approximately 22°," and now recites -- wherein said angles are approximately 30° -- .

Claims 14 and 16 have been amended to correct typographical/spelling errors. In particular, the term "exists" recited in claims 14 and 16 has been replaced with the term -- exits --. Support for these amendments can be found in column 4, lines 19-59. Hence, no new matter is believed entered by this amendment.

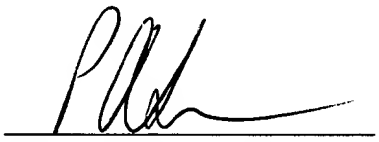
Claim 19 has been amended to correct indefiniteness in the recitation of "between third and said second chamber." In particular, the definite article "said" was inadvertently omitted between the terms "between" and "third" in this recitation. Since the "third chamber" element is positively recited for the first time in claim 13, from which claim 19 indirectly depends, the definite article "said" should have been recited between the terms "between" and "third" in claim 19 to refer back to the "third chamber." No new matter is believed entered by this amendment.

It is respectfully submitted that claims 1-20 are in condition for allowance, early notification of which is earnestly solicited. Should there be any questions or other matters whose

resolution may be advanced by a telephone call, the Examiner is cordially invited to contact Applicant's undersigned attorney at his number listed below.

No fee is believed due as a result of this communication. The Commissioner, however, is hereby authorized to charge any other fees which may be required or credit any overpayment to Deposit Account No. 04-1679.

Respectfully submitted,



Paul A. Schwarz, Esq.
Reg. No. 37,577

Duane, Morris & Heckscher LLP
100 College Road West, Suite 100
Princeton, New Jersey 08540
(609) 919-4408
(609) 919-4401 - facsimile

VERSION WITH MARKINGS TO SHOW CHANGES MADE

The following marked-up specification and claims correspond to the replacement specification and claims of this amendment.

The last paragraph starting at line 50 of column 1:

Fluid can flow through the prior art valve assembly 10 depicted in FIG. 1A in any one of the three directions depicted in FIGS. 1B-1D. The fluid flow is represented by arrows 25 in these figures. In FIG. 1B, which represents the forward product flow through the column, valve 14*a* is opened allowing the fluid to flow from the process piping into the valve assembly 10. Valve 16*a* is also opened allowing the fluid to flow into the chromatography column (not shown). The fluid returns from the chromatography column passing through valve 16*b* and reentering the valve assembly. The fluid leaves the valve assembly passing through valve 14*b* on its path back to the process piping. Valves 12*a* and 12*b* remain closed during this process. According to the reverse process flow depicted in FIG. 1C, fluid entering the valve assembly 10 from the process piping can flow through valves 12*a* and 16*b* into the column, returning from the column through valve 16*a*, and exiting the valve assembly through valve [12*a*] <u>12*b*</u> back through the process piping. Valves 14*a* and 14*b* remain closed during this process. The column may be bypassed altogether according to the process flow depicted in FIG. 1D, where the liquid entering into the valve assembly from the process piping encounters opened valves 12*a*, 14*a*, 12*b* and 14*b*, exiting the valve assembly without entering the chromatography column which remains inaccessible by closing valves 16*a* and 16*b*.

The fifth full paragraph of column 3 starting at line 24:

FIG. 3B is an enlarged cross-sectional view through line [A-A] 3B-3B of FIG. 3A;

The last paragraph of column 3 starting at line 36:

Referring to FIG. 2, there is shown a perspective view of the instant invention chromatography valve assembly 30. The valve assembly 30 comprises a unitarily formed valve body 32, which may be cast or machined from iron, bronze, stainless steel or aluminum, or may be molded from a suitable plastic or plastic composite material. The outer body 32 is generally that of an octahedral pyramid having a octagonal base 34, a square top surface 36, and a combination of triangular 35 and distorted hexagonal 48 side faces. The top square surface 36 is planar and mounted thereon is the first of five manual bonnet assemblies 38, 39, 40, 41, 42 for manually controlling the operation of the underlying valves. The operation of manual bonnets in diverter valve assemblies is well known to those skilled in the art, and is explained, for example, in afore-described U.S. Pat. No. 5,273,075, the specification of which is incorporated herein by reference. It should be noted that although manual bonnet assemblies are shown, other means such as pneumatic or electrical actuators may be mounted on the outer valve body in order to control the valves, thereby eliminating the need for the manual bonnets. The manual bonnets as shown are affixed to the valve body via plates 44, each plate having four suitable screw-type fasteners 46. Extending downwardly and outwardly from each edge of the top square surface 36 of the valve body 32 is a distorted hexagonal side face 48, each side face being planar and having a manual bonnet mounted thereon. These side faces are angled at approximately [22° (specifically 22.21°)] 30° with respect to the octagonal base of the valve body. The reason for

the particular angled mounting of the additional four bonnet assemblies 39, 40, 41, 42 has to do with valve drainage concerns, and will also be explained in detail later.

The second paragraph of column 4 starting at line 9:

Referring now to FIG. 3A, there is shown a top view of the valve assembly, minus the manual bonnets and with a partial cross-sectional view of the underlying channel network drawn in with broken lines. As can be seen in this figure, ports 50, 52, 54 and 56 are arranged at angles of approximately 90° with respect to each other on opposing ends of the octagonal base section of the valve assembly. Each port opens into a chamber in the valve assembly 30-port 50 opening into chamber 60, port 52 opening into chamber 62, port 54 opening into chamber 64, and port 56 opening into chamber 66. Fluid entering any of the ports encounters a chamber and channels leading to [three] at least two diverter valves. Fluid entering port 52, for example, encounters chamber 62 and channels leading to diverter valves 70 and 72. Fluid entering port 50, for example, encounters chamber 60 and channels leading to diverter valves 70, 76 and 78. The smooth and tortuous network of passageways that lead through the valve assembly connect the ports with the chambers and valves in a such a way that the valve assembly is fully drainable as will be later explained. The flow of the fluid is controlled by the diverter valves 70, 72, 74, 76, 78 and may be adjusted to permit specific flow directions which, in combination with the smooth and tortuous passageways, eliminate dead-legs from the system.

The third paragraph of column 4 starting at line 31:

Referring now to FIG. 3B, there is shown an enlarged cross-sectional view of the valve

assembly through line [A-A] 3B-3B of FIG. 3A. As can be seen in the figure, port 50 opens into chamber 60. A passageway 55 leading to diverter valve 76 can also be seen in this figure. Chamber 60 is connected to chamber 64 via diverter valve 78. The passageway that connects these two chamber is inclined, rising sharply before encountering diverter valve 78. The passageway that connects these two chamber is inclined, rising sharply before encountering diverter valve 78 and then falling sharply after encountering the valve. The angle of inclination 63 measured from either side of the diverter valve 78 is approximately 30°. In chamber 64, a passageway 65 leading to diverter valve 74 can be seen. Finally in this figure, port 54 can be seen as opening into chamber 64.

The fourth paragraph of column 4 starting at line 44:

Referring now to FIG. 3C, there is shown an enlarged side elevational view of the instant invention valve assembly 30. This particular side elevational view of the instant invention valve assembly 30. This particular side elevational view is directed down port 50 which is disposed on triangular surface 35. As explained above, port 50 opens into chamber 60 which is connected by channels to diverter valves 70, 76 and 78. In this figure, diverter valves 70 and 76 can be seen on opposite sides of port 50, being disposed beneath the afore-described distorted hexagonal side faces 48. These diverter valves, as well as diverter valves 72 and 74 (not shown in this figure), are machined in the position of their drain angle which is approximately [22° (specifically 22.21°)] 30° as measured from the octagonal base of the valve assembly. This arrangement, coupled with the fact that valve 78 (as seen in FIG. 3B) is at a high point in the valve assembly, allows the valve assembly 30 to be fully and easily drainable. Ports 56 and 52 are also clearly

visible in this figure.

1.(AMENDED) A diverter valve assembly for use in liquid chromatography comprising:

a unitarily formed valve body;

a plurality of ports in said valve body, at least one of said ports functioning as an inlet port for allowing liquid to enter into said valve body, at least one other of said ports functioning as an outlet port for allowing said liquid to exit said valve body, and at least two other of said ports capable of functioning as either inlet or outlet ports with respect to said liquid after said liquid has entered said valve body;

a plurality of chambers in said valve body, each one of said ports opening into an associated one of said chambers;

a tortuous network of channels in said valve body, each one of said channels extending between two of said chambers to provide communication therebetween; and

a plurality of diverter valves, each one of said valves interposed in the path of an associated one of said channels;

wherein liquid entering [any one] up to two of said ports encounters one of said chambers and sections of three of said channels which lead to three of said diverter valves thereby permitting the valve assembly to be fully drained.

8.(AMENDED) The diverter valve assembly of claim 7, wherein said angles are approximately [22°] 30°.

11.(AMENDED) A diverter valve assembly for use in a liquid chromatography system, comprising:

a unitarily formed valve body having a plurality of chambers and a tortuous network of passageways extending therethrough;

at least one inlet port connected to one of said plurality of chambers for receiving the flow of a liquid into said valves assembly;

at least one outlet port connected to one other of said plurality of chambers for allowing said liquid to exit said valve assembly;

at least two additional ports connected to two other of said plurality of chambers for allowing the flow of liquid already in said valve assembly to exit and reenter said valve assembly without exiting into said chromatography system; and

a plurality of diverter valves interposed between said plurality of chambers and ports, wherein fluid entering [any one] up to two of said ports encounters one of said chambers and sections of three of said channels which lead to three of said diverter valves thereby permitting a complete flushing of said valve assembly.

14.(AMENDED) The diverter valve assembly of claim 13, wherein fluid flowing in a first direction enters said valve assembly through said first port, passes through said first chamber, is directed across said first diverter valve into said second chamber, exits said valve assembly through said second port, reenters said valve assembly through said fourth port, passes through said fourth chamber, is directed across said third diverter valve, passes through said third chamber, and [exists] exits said valve assembly through said third port.

16.(AMENDED) The diverter valve assembly of claim 13, wherein fluid flowing in a second direction enters said valve assembly through said first port, passes through said first chamber, is directed across said fourth diverter valve into said fourth chamber, exits said valve assembly through said fourth port, reenters said valve assembly through said second port, passes through said second chamber, is directed across said second diverter valve, passes through said third chamber, and [exists] exits said valve assembly through said third port.

19.(AMENDED) The diverter valve assembly of claim 18, wherein said first diverter valve operates to prevent fluid communication between said first and said second chamber, said second diverter valve operates to prevent fluid communication between said third and said second chamber, said fourth diverter valve operates to prevent fluid communication between said third and said fourth chamber, and said fourth diverter valve operates to prevent fluid communication between said first and said fourth chamber.